

# Notice of Allowability

Application No.

10/717,645

Examiner

Michael Bernshteyn

Applicant(s)

OKUMURA ET AL.

Art Unit

1713

## -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 11/17/2006.
2. ☒ The allowed claim(s) is/are 4-9 and 11-14.
3. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
  - a) ☐ All b) ☐ Some\* c) ☒ None of the:
    1. ☐ Certified copies of the priority documents have been received.
    2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
    3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

\* Certified copies not received: \_\_\_\_\_.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.  
**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
  - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
    - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date \_\_\_\_\_.
  - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date \_\_\_\_\_.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

### Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date \_\_\_\_\_
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date \_\_\_\_\_
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other \_\_\_\_\_

Michael Bernshteyn  
Patent Examiner  
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### **DETAILED ACTION**

1. This Office Action is a response to the remarks filed on November 17, 2006. No claims have been amended; claims 1-3 and 10 have been withdrawn; claims 12-14 have been added.
2. Applicant's arguments, see remarks, filed on November 17, 2006 with respect to claims 4-9 and 11 have been fully considered and are persuasive. The rejection of claims 4-9 and 11 has been withdrawn.
3. Claims 1-14 are now pending.

### **EXAMINER'S AMENDMENT**

4. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Mr. William I. Solomon on January 29, 2007.

5. Claims 1-3 and 10 are cancelled without prejudice.

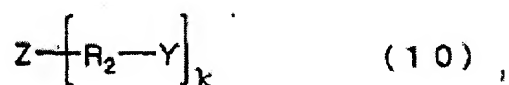
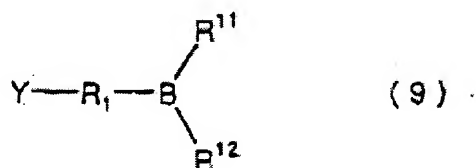
### ***Allowable Subject Matter***

6. Claims 4-9 and 11-14 are allowed.
7. The following is examiner's statement of reasons for allowance:

The present claims are allowable over the closest references: Nishiura (EP 1 160 268 A1) and Ykoyama et al. (WO 01/39316 or U. S. Patent 6,833,220).

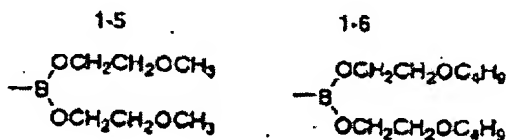
Nishiura discloses a polymeric electrolyte, which is improved in a transport rate of charge carrier ions by containing a boron atom containing polymeric compound and an electric device using the same (abstract).

The third ion-conductive polymeric compound can be obtained by polymerizing a mixture of compounds represented by the following general formulas (9) and (10), which are substantially identical to the claimed formulas (2) and (3) (page 6, [0035]):



The mixing ratio of the compound represented by formulas (9) and (10) is 1/99 to 99/1 in terms of weight ratio (page 6, [0037]).

In the above formulas Y represents a polymerizable functional group. Preferable examples thereof include a (meth)acrylic residue, an allyl group and a vinyl group (pages 6-7, [0039]). Many examples of  $\text{R}^{11}$  and  $\text{R}^{12}$  were described on pages 7-9, [0040]-[0043], and include the following:



Nishiura discloses that the polymeric electrolyte comprises one or more of the ion-conductive polymeric compounds, and an electrolytic salt. The electrolytic salt is not particularly limited. A lithium salt is preferably used. Examples thereof include  $\text{LiBF}_4$ ,  $\text{LiPF}_6$ ,  $\text{LiClO}_4$ ,  $\text{LiAsF}_6$ ,  $\text{LiCF}_3\text{SO}_3$ ,  $\text{LiN}(\text{CF}_3\text{SO}_2)_2$ ,  $\text{LiN}(\text{C}_2\text{F}_5\text{O}_2)_2$ ,  $\text{LiC}(\text{CF}_3\text{SO}_2)_3$ ,  $\text{LiCl}$ ,  $\text{LiF}$ ,  $\text{LiBr}$ ,  $\text{LiI}$ , derivatives thereof and the like. These lithium salts can be used either singly or in combination (page 10, [0055]-[0056]).

However, Noshiura does not disclose or fairly suggest such polymerizable composition as in the present claims, including both the boron-containing compound represented by formula 2 and the boron-containing compound represented by formula 3, or the molar ratio between these compounds, or the number of moles of the added oxyalkylene groups and advantages of the present invention due thereto.

Yokoyama discloses an electrolyte for secondary battery comprising an ionic compound and an organic polymer compound, wherein the organic polymer compound comprises a compound represented by the general formula (1) or a boric acid ester compound obtained by the esterification of the compound represented by the general formula (1) with boric acid or boric anhydride:



wherein  $\text{Z}_1$  represents a residue of compound having from 1 to 6 hydroxyl groups;  $\text{A}^1\text{O}$  represents one or a mixture of two or more of  $\text{C}_2 - \text{C}_4$  oxyalkylene groups;  $\text{R}^1$  represents a group selected from the group consisting of cyanoethyl group,  $\text{C}_1 - \text{C}_{12}$  hydrocarbon group and hydrogen atom; 1 represents an integer of from 0 to 600; and the suffix  $a$  represents an integer of from 1 to 6, with the proviso that  $1a$  ranges from 0

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to 600, and a secondary battery comprising the electrolyte for secondary battery (abstract).

Yokoyama discloses an electrolyte for secondary battery comprising an ionic compound and an organic polymer compound, wherein the organic polymer compound comprises a polymerization product of a compound represented by the general formula (2) or a polymerization product of a boric acid ester compound obtained by the esterification of the compound represented by the general formula (2) with boric acid or boric anhydride (col. 2, line 50 through col. 3, line 39):

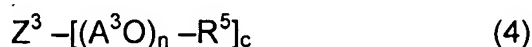


wherein  $Z^2$  represents a residue of compound having from 1 to 4 hydroxyl groups;  $A^2O$  represents one or a mixture of two or more of  $C_2 - C_4$  oxyalkylene groups;  $m$  represents an integer of from 0 to 150;  $b$  represents an integer of from 1 to 4, with the proviso that  $mb$  ranges from 0 to 300; and  $R^{sup.2}$  represents a hydrogen atom, cyanoethyl group or a group represented by the general formula (3):



wherein  $R^3$  and  $R^4$  each represent a hydrogen atom or methyl group.

Yokoyama also discloses the electrolyte for secondary battery, wherein the organic polymer compound further comprises a polymerization product of a compound represented by the general formula (4):



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wherein  $Z^3$  represents a residue of compound having from 1 to 4 hydroxyl groups;  $A^3O$  represents one or a mixture of two or more of  $C_2 - C_4$  oxyalkylene groups;  $n$  represents an integer of from 0 to 150;  $c$  represents an integer of from 1 to 4, with the proviso that  $nc$  ranges from 0 to 300; and  $R$  represents a hydrogen atom or a group represented by the general formula (5):



In the general formulae (1), (2) and (4), the  $C_2 - C_4$  oxyalkylene groups represented by  $A^1O$ ,  $A^2O$  and  $A^3O$  include oxyethylene group, oxypropylene group, oxybutylene group, and oxytetramethylene group. Preferred among these oxyalkylene groups are oxyethylene group and oxypropylene group. **These oxyalkylene groups may be used singly or in admixture of two or more thereof.** The polymerization of two or more of these oxyalkylene groups may be accomplished by either block polymerization process or random polymerization process (col. 4, lines 58-67).

In the case of the boric acid ester compound obtained by the esterification of a compound represented by the general formula (2) with boric acid or boric anhydride, at least one of  $R^2$  is a hydrogen atom. Preferably, all  $R^2$  each are a hydrogen atom (col. 5, lines 18-23).

In the groups represented by the general formulae (3) and (5),  $R^3$ ,  $R^4$ ,  $R^6$  and  $R^7$  each are a hydrogen atom or methyl group. The groups represented by the general formula (3) and (5) each are preferably an **acryloyl group** wherein  $R^3$ ,  $R^4$ ,  $R^6$  and  $R^7$  each are a hydrogen atom, respectively. Alternatively, the groups represented by the

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general formula (3) and (5) each are preferably a **methacryloyl group** wherein  $R^3$  and  $R^6$  each are a hydrogen group and  $R^4$  and  $R^7$  each are a methyl group (col. 5, lines 32-40). The polymerization product of a compound represented by the general formula (2) or (4) is a product of polymerization of polymerizable group, which is a residue of polymerizable group-containing compound such as acrylic acid, methacrylic acid and crotonic acid. The compound represented by the general formula (2) or (4) has at least one polymerizable group. In some detail, when  $Z^2$  and  $Z^3$  each are not a residue of polymerizable group-containing compound such as acrylic acid, methacrylic acid and crotonic acid, at least one of  $R^2$  and  $R^5$  has a polymerizable group represented by the general formula (3) or (5) (col. 5, lines 42-52).

The compounds represented by the general formulae (1), (2), (4) and (6) can be obtained by a ring opening polymerization process which has heretofore been known. These compounds can be synthesized, e.g., by polymerizing a compound having a hydroxyl group with a  $C_2 - C_4$  alkylene oxide such as ethylene oxide, propylene oxide, butylene oxide and tetrahydrofuran at a predetermined molar ratio in the presence of a ring opening polymerization catalyst such as alkaline metal salt (e.g., potassium hydroxide, lithium hydroxide, sodium methylate) and Lewis acid (e.g., boron trifluoride etherate, tin tetrachloride, aluminum trioxide) (col. 6, lines 38-50).

Yokoyama discloses that the compounds represented by the general formula (2) or (4) maybe used **singly or in combination of two or more thereof** for the purpose of providing good mechanical properties (col. 7, lines 52-54 and col. 10, lines 58-65). The polymerizable group contained in the compound represented by the general formula (2)

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or (4) is polymerized before the use of the compound. The polymerization of the polymerizable group is accomplished by the use of energy such as heat, ultraviolet ray, visible light and electron beam. The polymerization may be effected optionally in the presence of a polymerization initiator, which has heretofore been known (col. 7, lines 55-60).

Yokoyama discloses that examples of the ionic compound employable herein include alkaline metal salts such as  $\text{LiClO}_4$ ,  $\text{LiAsF}_6$ ,  $\text{LiPF}_5$ ,  $\text{LiBF}_4$ ,  $\text{LiCF}_3\text{SO}_3$ ,  $\text{Li}(\text{CF}_3\text{SO}_2)_2\text{N}$ ,  $\text{Li}(\text{C}_2\text{F}_5\text{SO}_2)_2\text{N}$ ,  $\text{Li}(\text{CF}_3\text{SO}_2)_3\text{C}$ ,  $\text{LiI}$ ,  $\text{LiSCN}$ ,  $\text{NaBr}$ ,  $\text{NaI}$ ,  $\text{NaSCN}$ ,  $\text{KI}$  and  $\text{KSCN}$ . Preferred among these alkaline metal salts are lithium salts such as  $\text{LiClO}_4$ ,  $\text{LiAsF}_6$ ,  $\text{LiPF}_6$ ,  $\text{LiBF}_4$ ,  $\text{LiCF}_3\text{SO}_3$ ,  $\text{Li}(\text{CF}_3\text{SO}_2)_2\text{N}$ ,  $\text{Li}(\text{C}_2\text{F}_5\text{O}_2)_2\text{N}$ ,  $\text{Li}(\text{CF}_3\text{SO}_2)_3\text{C}$ ,  $\text{LiI}$  and  $\text{LiSCN}$  (col/ 11, lines 17-23).

However, Yokoyama does not disclose or fairly suggest the claimed boron compounds of formula 2 or of formula 3, much less the average number of moles of the oxyalkylene groups or molar ratio between compounds of formula 2 and of formula 3; and/or advantages achieved through use of the compounds and amounts thereof.

8. As of the date of this Notice of Allowability, the Examiner has not located or identified any reference that can be used singularly or in combination with another reference including Noshiura et al. and Yokoyama al. to render the present invention anticipated or obvious to one of ordinary skill in the art.

9. In the light of the above discussion, it is evident as to why the present claims are patentable over the prior art.



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Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delay, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reason for Allowance".

### **Conclusion**

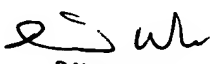
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Bernshteyn whose telephone number is 571-272-2411. The examiner can normally be reached on M-F 8-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Wu can be reached on 571-272-1114. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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